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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,731	05/12/2005	Shigeru Okaniwa	5486-051342	8989

28289 7590 01/09/2009

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EXAMINER	
MEHTA, MEGHA S	

ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
01/09/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/534,731	OKANIWA ET AL.	
	Examiner	Art Unit	
	MEGHA MEHTA	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 October 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *9-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *9-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment and arguments submitted October 24, 2008, have been acknowledged.

2. The 112 rejections have been overcome.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 9, 10, 11 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by "Mechanical Behavior of Friction Stir Welded Powder Metallurgy Aluminum Alloys and Composite" by Siddharth Sharma, Rajiv Mishra, Murray Mahoney and Kumar Jata (hereinafter "Sharma," cited in IDS).

Regarding claim 9, Sharma teaches a method of friction stir welding a sintered aluminum alloy pieces (IN9052, which is Al-4Mg-0.80-0.75C, and 7093 Al-15% vol SiC, as set forth in the Experimental Procedure, abstract and Introduction). "IN9052 and 7093 Al-15% vol SiC composites are examples of P/M processing," (abstract and 2nd sentence of introduction). It is noted that dictionary.com defines P/M, or "powder metallurgy," as "the art or science of manufacturing useful articles by compacting metal and other powders in a die, followed by sintering" and Miriam Webster's on-line dictionary defines it as "a branch of science or an art concerned with the production of powdered metals or of metallic objects by compressing a

powdered metal or alloy with or without other materials and heating without thoroughly melting to solidify and strengthen."

The claim recites sintered pieces "prepared by pressure sintering a mixture of rapid-solidified" aluminum alloy powder. This is a product by process limitation that does not further limit the scope of the claim (MPEP 2113).

Regarding claim 10, Sharma teaches the powder metallurgy processed 7093 Al-15% vol SiC composite (introduction paragraph 1 lines 3-4) where SiC is a ceramic. Sharma also teaches the IN9052 aluminum alloy with a "dispersion of fine oxide and carbide particles," (microstructure paragraph 3 lines 1-3). Oxides and carbides are both ceramics.

Similar to claim 9, claim 10 also recites product by process limitations, "pressure sintering a mixture…," and likewise does not determine patentability (MPEP 2113).

Regarding claim 11, Sharma teaches the grain size of the parent metal to be 0.5 microns and the grain size of the weld nugget to be 2 to 4 microns (microstructure paragraphs 3 and 4). Based on figure 4, one can use the scale bar to determine that the size of the particles is within the 10 microns or less range.

Regarding claim 20, the limitations are drawn to the pressure sintering step. As discussed earlier, this step is product by process and therefore also does not determine patentability (MPEP 2113).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma.

Regarding claim 19, Sharma does not explicitly teach the average particle size of 20-100 μm. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to determine the optimum particle size. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation," (MPEP 2144.05 Section II).

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma as applied to claim 9 above, and further in view of US 5,794,835 Colligan et al.

Regarding claim 12, Sharma teaches the friction stir welding of sintered aluminum alloys. Sharma does not teach the rotation rate, travel speed and tool specifications. Selection of a tool having particular dimensions/characteristics would have been well within purview of one having ordinary skill in the art depending on the materials being welded and the desired weld formation. However, Colligan teaches the required specifications in column 5, line 19-21 and column 6, lines 41-45. Colligan does not teach the radius of the shoulder. However, this would be readily determined by one of ordinary skill in the art based upon the processing conditions and the desired result. With routine optimization, the artisan can determine the optimal shoulder radius for the operation.

It would have been obvious to one of ordinary skill to combine Colligan with Sharma because they are both friction stir welding. It would have been obvious to use the tool of Colligan in the method of Sharma because it was successful in the welding of an aluminum

silicon magnesium alloy (also an aluminum alloy with a ceramic) as Colligan explains in column 5, lines 14-17, and only the predictable results would have been achieved.

8. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma as applied to claim 10 above, and further in view of US 4,195,215 Clarke.

Regarding claims 13 and 14, Sharma teaches the friction stir welding of sintered aluminum alloys with ceramic particles. Sharma does not teach an aluminum welding aid sandwiched between or mounted on pieces to be welded. Clarke teaches the use of a sealant with aluminum in between pieces to be welded together in column 3, lines 31-37 and column 4, lines 49-53. Clarke teaches a sealant without ceramic particles, as claim 14 requires. However, one could also add in the ceramic particles used in the composition of Sharma to increase strength (introduction paragraph 1 line 5).

It would have been obvious to combine Sharma and Clarke because they are both welding aluminum. It would have been obvious to include the sealant of Clarke in Sharma because this provides consistency even when irregularities exist and prevents weakening of the parent metal, as Clarke teaches in column 1, line 63 to column 2, line 5.

9. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma and US 4,195,215 Clarke as applied to claims 13 and 14 above, and further in view of US 3,602,682 Hoeffleur.

Regarding claims 15 and 17, Clarke teaches the welding aid between the sintered pieces. Clarke does not teach it to be a T or H-shaped section. Hoeffleur teaches applying a welding aid in between the pieces as well as upon them in column 1, lines 53-67. This would create a T or H-shaped section. Additionally, the shape of the welding aid would be obvious to one of ordinary

skill. If the artisan desires the welding aid to be between the pieces as well as on top of them, then he could use a T shaped section to create that desired end product.

Regarding claims 16 and 18, Clarke teaches the welding aid between the sintered pieces. Clarke does not teach another part of the welding aid not sandwiched between the pieces. Hoeffleur teaches applying a welding aid in between the pieces as well as upon them in column 1, lines 53-67. Hoeffleur does not teach varying ratios of ceramic particles. However, this is adjustable based upon the artisan and the desired final product. Sharma teaches that particles increase strength (introduction paragraph 1 line 5). One could modify the amount of particles added in order to obtain the desired properties while still being able to properly process the pieces.

It would have been obvious to combine Clarke and Hoeffleur because they both teach using a welding aid. It would have been obvious to include the welding aid of Hoeffleur in the sealant of Clarke because the aid in Hoeffleur functions as a cement as well and holds the pieces together before welding has even begun as Hoeffleur explains in column 1, lines 53-67.

10. Claims 9, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Sharma.

Regarding claim 9, it appears that AAPA teaches it being known in the art to weld a sintered aluminum alloy by welding sintered pieces (prepared by pressure sintering rapid-solidified) aluminum alloy powder (p. 1, line 8 - p. 2, line 2). It is noted that these aluminum alloys are dispersed with ceramic particles (p. 1, line 28 – p. 2, line 2). The AAPA teaches arc-welding the sintered aluminum alloy pieces (p. 1, lines 23-27). AAPA does not teach friction stir welding these pieces.

Sharma teaches it being undesirable to use fusion welding processes, such as laser and gas metal welding, to weld sintered pieces of aluminum alloy powder because it creates a cast microstructure that adversely affects mechanical properties of the joint (Introduction). Sharma uses friction stir welding in its place because it "avoids most of the problems associated with fusion welding" and results in a fine microstructure and improved mechanical properties of the joint (Introduction). It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the fusion welding process of AAPA (arc-welding, which is a form of gas metal welding) with the friction stir welding of Sharma to join the alloys of AAPA to avoid the problems associated with arc-welding and for the benefit of achieving a fine microstructure and improved mechanical properties of the joint.

Regarding claim 10, AAPA teaches that it is known to use sintered composites with ceramic particles. "Sintered alloy also has the advantage that ceramic particles can be dispersed in a matrix with ease, although dispersion of ceramic particles is difficult according to a conventional ingot process. Various properties, e.g. high strength, heat-resistance or neutron absorption, are imparted to aluminum alloys by selection of ceramic particles to be dispersed," (paragraph [0002]).

Regarding claim 11, Sharma teaches the grain size of the parent metal to be 0.5 microns and the grain size of the weld nugget to be 2 to 4 microns (microstructure paragraphs 3 and 4). Based on figure 4, one can use the scale bar to determine that the size of the particles is on the same order of magnitude. The MPEP section 2144.05 says that "' [W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.'"

11. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) and Sharma as applied to claim 9 above, and further in view of US 5,794,835 Colligan et al.

Regarding claim 12, Sharma teaches the friction stir welding of sintered aluminum alloys. Sharma does not teach the rotation rate, travel speed and tool specifications. Selection of a tool having particular dimensions/characteristics would have been well within purview of one having ordinary skill in the art depending on the materials being welded and the desired weld formation. However, Colligan teaches the required specifications in column 5, line 19-21 and column 6, lines 41-45. Colligan does not teach the radius of the shoulder. However, this would be easy for one of ordinary skill in the art to determine based upon the processing conditions and the desired result. With routine optimization, the artisan can determine the optimal shoulder radius for the operation.

It would have been obvious to one of ordinary skill to combine Colligan with Sharma because they are both friction stir welding. It would have been obvious to include the tool of Colligan with the method of Sharma because it was successful in the welding of an aluminum silicon magnesium alloy (also an aluminum alloy with a ceramic) as Colligan explains in column 5, lines 14-17.

12. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) and Sharma as applied to claim 10 above, and further in view of US 4,195,215 Clarke.

Regarding claims 13 and 14, Sharma teaches the friction stir welding of sintered aluminum alloys with ceramic particles. Sharma does not teach an aluminum welding aid

sandwiched between or mounted on pieces to be welded. Clarke teaches the use of a sealant with aluminum in between pieces to be welded together in column 3, lines 31-37 and column 4, lines 49-53. Clarke teaches a sealant without ceramic particles, as claim 14 requires. However, one could also add in the ceramic particles used in the composition of Sharma to increase strength (introduction paragraph 1 line 5).

It would have been obvious to combine Sharma and Clarke because they are both welding aluminum. It would have been obvious to include the sealant of Clarke in Sharma because this provides consistency even when irregularities exist and prevents weakening of the parent metal, as Clarke teaches in column 1, line 63 to column 2, line 5.

13. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) and Sharma in view of US 4,195,215 Clarke as applied to claims 13 and 14 above, and further in view of US 3,602,682 Hoeffleur.

Regarding claims 15 and 17, Clarke teaches the welding aid between the sintered pieces. Clarke does not teach it to be a T or H-shaped section. Hoeffleur teaches applying a welding aid in between the pieces as well as upon them in column 1, lines 53-67. This would create a T or H-shaped section. Additionally, the shape of the welding aid would be obvious to one of ordinary skill. If the artisan desires the welding aid to be between the pieces as well as on top of them, then he could use a T shaped section to create that desired end product.

Regarding claims 16 and 18, Clarke teaches the welding aid between the sintered pieces. Clarke does not teach another part of the welding aid not sandwiched between the pieces. Hoeffleur teaches applying a welding aid in between the pieces as well as upon them in column 1, lines 53-67. Hoeffleur does not teach varying ratios of ceramic particles. However, this is

adjustable based upon the artisan and the desired final product. Sharma teaches that particles increase strength (introduction paragraph 1 line 5). One could modify the amount of particles added in order to obtain the desired properties while still being able to properly process the pieces.

It would have been obvious to combine Clarke and Hoeffleur because they both teach using a welding aid. It would have been obvious to include the welding aid of Hoeffleur in the sealant of Clarke because the aid in Hoeffleur functions as a cement as well and holds the pieces together before welding has even begun as Hoeffleur explains in column 1, lines 53-67.

Response to Arguments

14. Applicant's arguments filed October 24, 2008, have been fully considered but they are not persuasive.

Applicant argues that the amendment for claim 9 overcomes the 102 and 103 rejections. However, the restatement of claim 9 does not change the product by process limitation. It only restates it in a different way. The sintering limitation required by claim 9 is met by the P/M processing in Sharma because powder metallurgy processing includes a sintering step, as shown by the definitions recited above. Additionally, claim 20 is also a product by process claim.

Applicant argues that the Office Action does not establish by one would combine AAPA with Sharma. However, the Office Action of July 24, 2008, states on page 7 that "[i]t would have been obvious to one of ordinary skill in the art at the time of the invention to replace the fusion welding process of AAPA (arc-welding, which is a form of gas metal welding) with the friction stir welding of Sharma to join the alloys of AAPA to avoid the problems associated with arc-

welding and for the benefit of achieving a fine microstructure and improved mechanical properties of the joint.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MEGHA MEHTA whose telephone number is (571)270-3598. The examiner can normally be reached on Monday to Friday 7:30 am to 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Megha Mehta/
Examiner, Art Unit 1793

/Kevin P. Kerns/
Primary Examiner, Art Unit 1793